A1. QUALITY ASSURANCE PROJECT PLAN
FOR
TIDEWATER BAILING SITE
NEWARK, NEW JERSEY

U.S. EPA Work Assignment No.: 0-292
Lockheed Martin Work Order No.: EAC00292
U.S. EPA Contract No.: EP-C-04-032

Prepared For:
United States Environmental Protection Agency/Environmental Response Team
Edison, New Jersey

November 2007

Approved By:

REAC Task Leader	Date 11-21-07
REAC Group Leader	Date 11/21/07
REAC Quality Assurance Officer	Date 11/21/07
REAC Program Manager	Date 11/21/07
U.S. EPA Work Assignment Manager	Date 11/26/07

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A. PROJECT MANAGEMENT

This Quality Assurance Project Plan (QAPP) was prepared in accordance with *EPA Requirements for Quality Assurance Project Plans (QAPPs), EPA QA/R5* and the *Response Engineering and Analytical Contract (REAC) Program QAPP*. This QAPP follows the graded approach outlined in the Uniform Federal Policy (UFP)-QAPP.

A3. DISTRIBUTION LIST

The following personnel will receive copies of the approved QAPP for soil sampling at the Tidewater Bailing Site, Work Assignment (WA) No. 0-292:

1. Raj Singhvi, Environmental Protection Agency/Environmental Response Team (EPA/ERT) Work Assignment Manager (WAM)
2. Mark Sprenger, EPA/ERT
3. Deborah Killeen, REAC Quality Assurance Officer (QAO)
4. Martin Ebel, REAC Task Leader (TL)/Quality Control (QC) Coordinator
5. Ken Woodruff, REAC Geology Group Leader
6. Dennis Miller, REAC Program Manager

A4. PROJECT ORGANIZATION

The following individuals will participate in the project:

EPA/ERT
Raj Singhvi - WAM
Mark Sprenger - Technical Oversight

REAC
Martin Ebel - TL/QC Coordinator
Deborah Killeen - QA/Validation and Field Oversight
Miguel Trespalacios - Air Environmental Scientist
Dennis Kalnicky - XRF Chemist/Inorganic Chemist
Nesya Belyarchik - Database Manager, ACAD Support
Shiv Sahni - Organic Extraction Chemist
Girma Admassu - Analytical Chemist
Dennis Kalnicky - Inorganic Chemist
Charles Gasser - Inorganic Chemist
Naresh Bhatt - Inorganic Preparation Chemist
Ray Varsolona - Data Validator
Mark Bernick - Data Validator
Yash Mehra - Report Writer

The ERT/REAC Laboratory in Edison, New Jersey (NJ) will receive soil, dust and turf samples for the analysis of lead by inductively-coupled plasma (ICP) and/or polychlorinated biphenyls (PCBs). Samples will be split with the City of Newark contractor, Weston Solutions.

The REAC TL/QC Coordinator for the project is the primary point of contact with the EPA/ERT WAM. The TL is responsible for the completion of the Work Plan (WP) and QAPP, project team organization, and supervision of all project tasks, including reporting and deliverables.

A5. PROBLEM DEFINITION

Background. The Tidewater Bailing site covers approximately 2.5 acres and is located in a mixed residential and commercial area of Newark, Essex County, New Jersey (NJ). A new soccer field is located on site and is covered with artificial turf that overlies an older ball field. Tidewater Bailing (Tidewater) began operating at the site in 1945, processing and recycling a variety of scrap metal. It is not known when operations ceased but reportedly the ball field may have been impacted. A site investigation by the New Jersey School Construction Corporation was completed in 2003 in order to evaluate the property for a new public high school. Test pits and borings indicated elevated levels of heavy metals, PCBs and petroleum hydrocarbons in site soils. Lead concentrations were as high as 32,000 milligrams/kilogram (mg/kg) at depths of less than one foot.

Further investigations under the direction of EPA in April 2007 continued to show high lead concentrations, up to 3,790 mg/kg in six soil samples collected near St. Charles Street to the west. Other contaminants included copper, zinc, and polychlorinated biphenyls (PCBs).

A6. PROJECT DESCRIPTION AND SCHEDULE

The objective of this sampling event is to determine the source of the lead recently discovered by the State of New Jersey on the artificial turf. A field portable x-ray fluorescence (XRF) unit will be used to initially screen bare soil in-situ and the artificial turf for lead at sample locations selected in the field. Select areas outside of the normal playing area with XRF results showing high lead concentrations will then be sampled. Soil perimeter samples will be collected for lead and PCB analysis along St. Charles Street and along Tidewater. Samples will be collected from each of the bases, home plate, the pitchers mound and the dugouts on and around the playing field for lead and PCB analysis. At up to five locations on the artificial turf, the following samples will be collected and analyzed for lead: (1) artificial turf, (2) dust/dirt collected using a vacuum, (3) two mat samples from beneath the artificial turf, and 4) soil beneath the artificial turf, if available. All of these samples will be returned to REAC for analysis. At the request of the WAM, samples may be split and provided to other contractors.

The schedule of activities and reports is as follows:

• Work Plan (WP)	November 21, 2007
• Draft QAPP	November 1, 2007
• XRF In-situ Analysis	November 1, 2007
• Field Sampling	November 1, 2007
• Preliminary Analytical Results	November 6 through 16, 2007
• Final Analytical Report	November 21, 2007
• Final QAPP	November 21, 2007
• Trip Report	November 21, 2007
• Post Deliverables/Data to ERT/IMS Website	As available

A7. DATA QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT OF DATA

The objectives of this investigation are to generate data that will assist in the determination of the source of lead at the site. Analytical data from the sampling event will be compared to site clean-up goals to determine if levels pose a potential health risk and further action is required. The NJ residential direct contact soil cleanup goal is 400 milligrams per kilogram (mg/kg) for lead. This criterion is based on the USEPA Integrated Exposure Uptake Biokinetic (IEUBK) model utilizing the default parameters. The concentration is considered to protect 95% of target population (children) at a blood level of 10 micrograms per deciliter (µg/dl). The typical detection limit for lead measured by XRF is 50 to 60 mg/kg using a 60-second exposure time; however, actual detection and quantitation limits will be determined on site. The reporting limit for lead using ICP is 1.0 mg/kg.

Data categories (DCs) corresponding to the data use objectives required for successful completion of this WA are summarized in Table 1, *Field Sampling Summary* and Table 2, *QA/QC Analyses and Data Categories Summary*. Two

of the three DCs based on the two Superfund Data Categories described in the 1993 Office of Solid Waste and Emergency Response (OSWER), Office of Emergency and Remedial Response (OERR) Directive, Screening Data and Definitive Data, will be used for this WA and are described below.

Screening data will be applicable to "real-time" monitoring data using the XRF. Screening data without definitive confirmation is not considered to be "data of known quality." The following requirements for "Screening Data (SD)" are applicable:

- Sample documentation in the form of field logbooks and appropriate field data sheets. Chain of custody (COC) records are optional for field screening locations.
- All instrument calibration and/or performance check procedures/methods will be summarized and documented in the field/personal or instrument log notebook. The manufacturer's instructions or standard operating procedures (SOPs) should specify the procedure and frequency for calibration during use.
- Detection limit(s) will be determined and documented, along with the data, where appropriate.

Definitive data is used for all data collection activities that require a high level of accuracy using EPA, National Institute of Occupational Safety and Health (NIOSH) and other industry-recognized methods. For the data to be definitive, either total measurement error or analytical error must be determined. Definitive data will be used to assess health risk or environmental impact, delineation of contaminants, treatment and disposal. The following requirements for "Definitive Data (DD)" are applicable for lead and/or PCBs in soil, dust and turf samples:

- Sample documentation in the form of field logbooks, the appropriate field data sheets, and COC forms will be provided.
- All instrument calibration and/or performance check procedures/methods will be summarized and documented in the field/personal or instrument log notebook.
- Detection limit(s) will be determined and documented, along with the data, where appropriate.
- Sample holding times will be documented; this includes documentation of sample collection and analysis dates.
- Initial and continuing instrument calibration data will be provided.
- For soil samples, rinsate blanks, field blanks, and trip blanks will be included at the rates specified in Table 1.
- Performance Evaluation (PE) samples are optional.
- Analyte identification will be confirmed on 100 percent (%) of the samples by analytical methods associated with definitive data.
- Quantitation results for all samples will be provided.
- Analytical or total measurement error must be determined on 100% of the samples.
    - Analytical error determination measures the precision of the analytical method. At a minimum, two replicate aliquots are taken from a thoroughly homogenized sample or two media blanks, prepared and analyzed in accordance with the method, calculated and compared to method-specific performance criteria.
    - Total measurement error is determined from independently collected samples from the same location and analyzed by analytical methods associated with definitive data. Quality control parameters such as the mean, variance, and coefficient of variation is calculated and compared to established measurement criteria.

Approximately 30 samples will be collected for this project, including soil samples and artificial turf samples and/or the underlying mat, if present. The exact number of samples may will be determined by the WAM depending on field conditions. Tables 1 and 2 identify analytical parameters desired; type, volume and number of containers needed; preservation requirements; number of samples to be collected; and associated number and type of QA/QC samples based on the data category.

The data use categories are based on the Data Quality Indicators (DQIs) used to determine the acceptability or usability

of the data. Two DQIs used in the laboratory measurement process that will be evaluated during the validation procedure are precision and accuracy.

- Precision is a measure of agreement between replicate measurements under similar conditions and may be expressed as Relative Percent Difference (RPD). For soil samples, the RPD will be calculated in the REAC laboratory between a matrix spike (MS) and matrix spike duplicate (MSD). A Percent Difference (%D) or RPD may be calculated between the results of a sample and a field duplicate sample after the measurement process is complete.

- Accuracy is a measure of the agreement between an observed value and an accepted reference value. This will be determined by analyzing a known reference material or a sample to which a specific amount of a known reference material has been added to. Accuracy will be expressed as Percent Recovery (%R). Since accuracy takes into account the effects of variability (precision), accuracy is a combination of bias and precision.

A8. TRAINING AND CERTIFICATION

All field personnel that visit the site will have the following documented training:

- Occupational Safety and Health (OSHA) 40-hour and 8-hour refresher in Hazardous Waste Operations (29 CFR1910.120)
- Department of Transportation (DOT) hazardous materials shipping
- First Aid and Cardiopulmonary Resuscitation (CPR) Training (at least one team member)

Field analytical and laboratory personnel conducting on-site XRF and lead analysis by ICP will have demonstrations of capability on file at the ERT/REAC Laboratory. Samples will be analyzed by a National Environmental Laboratory Accreditation Committee (NELAC) accredited laboratory.

A9. DOCUMENTS AND RECORDS

The REAC Program QAPP serves as the basis for this site-specific QAPP. The most current approved version is available to all REAC technical personnel as an uncontrolled copy on the REAC Local Area Network (LAN). Documents and records that may be generated during this project include:

- WP
- QAPP
- Site Maps
- Site Logbooks
- Laboratory Logbooks
- Vacuum Sampling Work Sheets
- Sample Labels
- Custody Seals
- Projected Work Assignment (PWA)
- Data Validation Reports
- Data Assessment Forms
- Data Review Records
- Data Reduction Records
- Laboratory Instrument Print-Outs
- Scribe Data Files
- Chain-of-Custody (COC) forms
- Field Change Form (if necessary)
- Final Analytical Report
- Trip Reports

All documentation will be recorded in accordance with REAC standard operating procedure (SOP) #4001, *Logbook Documentation* and REAC SOP #2002, *Sample Documentation*. The Final Analytical Report will be generated using REAC SOP #4020, *Analytical Report Preparation*. The Trip Report will be prepared using SOP #4017, *Preparation of Trip Reports*.

B. DATA GENERATION AND ACQUISITION

B1. SAMPLING PLAN DESIGN

Judgmental sampling will be used to subjectively select sample locations based on visual inspection, screening results from the XRF or best professional judgment. This type of sampling will be used to locate and identify the areas with contamination. Results obtained will provide information about those specific locations collected at a specific time. Approximately 20 surface soil samples from areas of bare soil from inside and outside the playing area will be collected. XRF screening will be used to select locations on the artificial turf for dirt/dust samples, artificial turf samples, turf mat samples and soil samples beneath the turf. Turf and mat samples will be collected from areas outside the baseball and soccer playing fields.

B2. SAMPLING/MONITORING METHODS

Soil Sampling. Surficial soil samples (0 to 2 inches in depth) will collected in areas of bare soil using dedicated plastic spoons. Samples will be homogenized by mixing thoroughly and placed in 4-ounce glass jars to be returned to the ERT/REAC Laboratory for lead analysis. The same procedure will be followed for those soil samples collected beneath the artificial mat, if feasible. All samples will be collected in accordance with REAC SOP #2012, *Soil Sampling*.

Vacuum Sampling. Vacuum sampling will be performed in accordance with modified REAC SOP #2040, *Collection of Indoor Dust Samples From Carpeted Surfaces for Chemical Analysis Using a Nilfisk GS-80 Vacuum Cleaner*. Although the method specifies the size and shape of the areas to be sampled and the mass to be collected, the sample collection procedure may be varied to accommodate site-specific conditions and ensure that an adequate sample is obtained. The collected samples will be placed into appropriately-sized glass jars or zip-lock plastic bags. All samples will be returned to the REAC facility to be sieved prior to analysis for lead.

Turf and Mat Sampling. At those locations selected by the WAM, an approximate 12-inch x 12-inch cut will be made into the Astro Turf and a portion of the turf and the mats will be removed using a non-dedicated stainless steel utility knife. The knife will be cleaned between samples using deionized water and isopropyl alcohol to dry. The turf will be separated from the mats; Mat 1 being the mat directly beneath the Astro Turf and Mat 2 being directly below Mat 1. Any solid material found to be present under the Astro Turf and above Mat 1 will also be submitted for lead analysis. All samples will be submitted to the ERT/REAC Laboratory for lead analysis by ICP.

XRF Screening. XRF screening provides a quick, preliminary assessment of site contamination, and provides preliminary analyte identification and quantification. In-situ soil measurements and surface measurements of the Astro Turf will be collected and recorded. Screening will be conducted in accordance with REAC SOP #1720, *Operation of the NITON XLt792YW Field Portable X-Ray Fluorescence Unit*.

B3. SAMPLE HANDLING AND CUSTODY

Samples will be returned by REAC personnel directly to the ERT/REAC Laboratory for analysis. Soil, artificial turf and mat samples (if applicable) will be placed in a cooler with ice packs and a COC record for transport to the ERT/REAC Laboratory. The COC summarizes and identifies the samples and will be generated for each shipping container or cooler. All COCs will receive a peer review in the field prior to transport in accordance with REAC SOP #4005, *Chain of Custody Procedures*. At least two custody seals will be placed across the shipping containers to ensure sample integrity.

All dust samples delivered to the REAC facility will be sieved in accordance with modified REAC SOP 2040, *Collection of Indoor Dust Samples From Carpeted Surfaces for Chemical Analysis Using a Nilfisk GS-80 Vacuum Cleaner*. The samples will be sieved through a No. 100 sieve (150 microns [μm]). The total and sieved weights for each samples will be measured and recorded to calculate the dust loading. After sieving, the samples will be either transferred to jars and placed into Ziplok™ storage bags, or directly into Ziplok™ storage bag. All samples will be maintained for 60 days after the issuance of the final report. If no additional testing is requested at the end of the 60 days, arrangements will be made for disposal. Untreated soil samples will be returned to site whenever permissible.

The turf samples will be washed with deionized water several times until the water runs clear. The turf will be allowed to air dry prior to analysis. Lead analysis will be conducted on a portion of the whole turf sample (fibers and backing) and also on the fibers themselves to isolate the source of the lead. The mat samples will be cut into small pieces prior to digestion.

B4. ANALYTICAL METHODS

The following REAC SOPs will be used for the analysis of soil, turf, dust and residue samples:

- REAC SOP #1811, *Determination of Metals by Inductively Coupled Plasma (ICP) Methods*
- REAC SOP #1801, *Routine Analysis of PCBs in Water and Soil/Sediment Samples by GC/ECD*

B5. QUALITY CONTROL

Field QC samples are designed to assess the variability of the matrix or medium being sampled, and to detect contamination and sampling error in the field. The following field QC samples will be collected for this project:

- Field duplicate with the frequency of one in 20 samples for the soil matrix
- Sufficient mass will be collected for the matrix spike/matrix spike duplicate (MS/MSD) analysis at the frequency of 10% of samples collected
- All data must be documented in Scribe files and on field data sheets or within site logbooks.

The following QC checks will be conducted for the field portable XRF:

- A blank check must be performed and documented at the beginning of each day or eight-hour shift, after calibration, after selecting a test mode, or whenever the instrument drifts on the blank or a low-level sample.
- A low- or mid-level sample (e.g., SRM or RCRA sample) will be run at the beginning and end of sample analysis to determine precision. The percent relative standard deviation (%RSD) should be within ± 20 percent.
- NIST SRMs #2709, 2710 or 2711 will be analyzed and should fall within ± 20% of the true value for contaminant concentrations at least five times the XRF MDL.

Quality control checks will be done in the laboratory prior to arriving on site.

Laboratory QC samples are analyzed in the laboratory and are used to determine any matrix effects and to assess the performance of the laboratory. Quality control for metals of which lead is the target compound will follow REAC SOP #1811 and will include the following:

- Matrix spike (MS) and MS duplicate (MSD) samples will be analyzed for 10% of the samples collected
- Laboratory control sample (LCS) at the frequency of one in 20 samples
- Method blank with each batch not to exceed 20 samples
- Additional operational QC samples required by the analytical method (e.g., initial and continuing calibrations, interference check samples, serial dilutions, etc.)

Acceptance criteria for QC samples can be found in the cited analytical SOP.

Laboratory quality control for PCBs will follow REAC SOP #1801 and will include the following:

- Minimum 5-point calibration curve using certified standards prior to sample analysis.
- Continuing calibration using mid-point standard every 12 hours and after every ten samples.
- One MB will be analyzed with each batch of 20 samples.
- LCS will be analyzed at a 5% frequency.
- MS/MSD samples will be analyzed for 10% of the samples collected.
- Additional operational QC required by the method.

Acceptance criteria for QC samples can be found in the cited analytical SOP.

B6. INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

The ability to generate data of known quality is dependent on the maintenance of equipment and analytical instrumentation on a routine and as needed basis. Preventive maintenance actions are taken to prevent instruments from failing during use, to ensure proper instrument performance, and to increase the reliability of the measurement system. Typically, maintenance is initiated when the QC requirements of the method are not met, previous experience with the instrument indicates maintenance should be performed, manufacturer's recommendations, a schedule determined by each group, or prior to and after monitoring and sampling. Each piece of equipment and analytical instrument is assigned a preventive maintenance logbook. All maintenance activities are recorded in this logbook and include the following information: date of service, person/vendor performing the service, type of maintenance performed and the reason, parts replaced, and any other pertinent information. In addition, an ample supply of spare parts are maintained by each group to minimize downtime of the equipment/instruments. Each piece of equipment will be checked operationally prior to deployment.

Repairs are defined as any unscheduled service or maintenance required on equipment or instrumentation that cannot be handled by REAC personnel. Any repairs made on equipment or instrumentation is also documented in the preventive maintenance log. The service or work order should be taped in the logbook, and signed and dated across the tape. Maintenance on monitoring instruments is conducted monthly depending on the type of instrument.

The vacuum nozzles, wands and hoses will be decontaminated after use with a bottle brush, to remove any accumulated dust in the hose and nozzle. After the nozzle is clean, it will be removed and sprayed with reagent grade isopropyl alcohol and allowed to air dry on a clean surface. The wand and hose will then be cleaned with a bottle brush. To continue, a new polyliner and collection bag for the collection of another sample will be installed.

B7. INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

There are two types of calibration -operational and periodic. Operational calibration is routinely performed as part of instrument usage, such as development of a standard curve. Periodic calibration is performed at prescribed intervals, such as balances and ovens and is relatively stable in performance.

Operational calibration is generally performed as part of the analytical procedure and is dependent upon the type of instrumentation. Typically, certified standards with certificates of analysis are used to prepare calibration standards for analytical instruments. The preparation of all reference standards for calibration follow the guidelines specified in REAC SOP #1012, *Preparation of Standard Solutions*. Preparation of a standard curve is accomplished by using calibration standards containing the species to be analyzed into a specific solvent mixture to be introduced into the instrument. The concentrations of the working standards are chosen to cover the working range of the instrument. The calibration curve is prepared by plotting instrument response versus the concentration of the standards. Concentrations of the samples analyzed are read directly from the calibration curve or determined by interpolation.

Instrument calibration typically consists of two types: initial calibration and continuing calibration. Initial calibration procedures establish the calibration range of the instrument and determine the instrument response over that range. The instrument response may be area counts, peak height, or absorbance, and is expressed as a % relative standard deviation (RSD) or a correlation coefficient. Continuing calibration measures the instrument response to a single calibration standard, and the response is compared with the initial calibration. Continuing calibration may be used as a single point within a 12 hour period, or every 10 samples, depending on the analyte to be measured.

Periodic calibration is performed on equipment required for analytical methods, but not routinely calibrated as part of the analytical procedure. Analytical balances are calibrated on an annual basis by an external agency. Balances are routinely calibrated using Class "S" weights that are purchased with a certificate of traceability. Class "S" weights are routinely calibrated every three years. Several National Institute of Standards and Technology (NIST) reference thermometers are used to calibrate the working thermometers in refrigerators, freezers, and ovens. Glass thermometers are compared with the NIST thermometers every 12 months. Metal and probe-type thermometers are calibrated on a quarterly basis.

For the XRF unit, the self-calibration or energy calibration must be performed each time the instrument is used and may be performed every two to four hours during sample analysis to maintain proper detector calibration. A detector resolution check must be performed and documented at the beginning of each day or eight-hour shift.

For ICP metal analysis, calibration using a blank and high standard will be run prior to the analysis of samples. An initial calibration verification (ICV) immediately following calibration and a continuing calibration verification (CCV) after every ten samples will be run. For PCB analysis, calibration using a minimum of a five-point curve will be run prior to the analysis of samples. A continuing calibration will be run every 12 hours. Calibrations are documented within instrument/equipment-specific maintenance logbooks.

B8. INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Materials purchased by REAC personnel must meet the requirements specified in the field or analytical procedures. The REAC TL and Group Leaders are responsible for ensuring that suitable grades of materials are specified in purchase orders; verifying upon receipt that the materials meet the specified requirements and certificates of analysis are received, if applicable; verifying that materials are stored properly in accordance with material storage and health and safety requirements; removed from use when the shelf life has expired, and; disposed of in an appropriate manner.

If a procedure does not specify the purity of materials, it is generally assumed to be analytical grade or the highest purity obtainable. The contents of each lot of solvent or each lot of sorbent tubes are checked to determine their suitability for sampling and/or analysis.

All chemical reagents, solvents, sorbent tubes and gases are stored in accordance with manufacturer/vendor recommendations or REAC health and safety guidelines. Standards are not maintained longer than recommended by the manufacturer or as specified in REAC SOP #1012, *Preparation of Standard Solutions*. At a minimum, specifications for American Society for Testing and Materials (ASTM) Type II water should be met.

REAC personnel have the responsibility for the inspection and acceptance of supplies and consumables. It is the responsibility of the EPA/ERT to provide adequate facilities, equipment and supplies for REAC to perform all field related tasks for this WA. The REAC contractor is responsible for the procurement, inspection, and acceptance of supplies and consumables for this WA.

B9. NON-DIRECT MEASUREMENTS

Analytical results from previous work at the site by other state agencies, the EPA, or the potentially responsible parties (PRPs), may be compared with results from additional sampling that may be done while the present WA is in effect.

B10. DATA MANAGEMENT

Samples will be delivered under COC to the ERT/REAC Laboratory. Samples will be identified by the field assigned number. The incoming samples will be checked against the COC for accuracy and assigned a unique laboratory number, which identifies the sample to the laboratory personnel. This number can later be cross-referenced to the field number. All laboratory procedures will be reviewed and the data verified for the appropriate QA objectives. Any problems identified will be brought to the attention of the REAC TL and the EPA/ERT WAM for resolution before release of the Final Analytical Report. A paper version of the Final Analytical Report will be provided to the TL, the WAM and stored in the REAC Central Files. An electronic format of all deliverables will be saved on the REAC archive drive in accordance with Administrative Procedure (AP) #34, *Archiving Electronic Files*. All data deliverables for this WA will be posted to the ERT-Information Management System (IMS) website either as a Scribe electronic data deliverable (EDD) or in portable document format (.pdf). Any SOPs or APs referenced in this QAPP are available as uncontrolled copies on the REAC LAN. Site logbooks and field sampling worksheets will also be archived once the project is completed and the WA 0-292 is closed.

C. ASSESSMENT AND OVERSIGHT

C1. ASSESSMENT AND RESPONSE ACTIONS

The Task Leader, Geology Group Leader, Analytical Section Leader, Quality Assurance Officer (QAO), and QC Coordinator are responsible for quality control assessments and corrective action for this WA. The tasks associated with this QAPP are assessed through the use of peer reviews, technical systems audits, and management system reviews. Management system reviews establish compliance with prevailing management structure, policies and procedures, and ensures that the required data are obtained. All project deliverables will receive an internal peer review prior to release, per guidelines established in the REAC AP #22, *Peer Review of REAC Deliverables.*

The EPA WAM for this task will have the responsibility for verifying that the proper SOPs and sampling procedures are followed. If any technical issues or deficiencies are identified, they will be reported to the REAC Task Leader for immediate resolution or corrective action. Any changes in scope of work will be documented on a Field Change Form and approved by the WAM.

C2. REPORTS TO MANAGEMENT

REAC Report	Recipients
Monthly Progress	EPA/ERT Project Officer and WAM
Quarterly Quality Assurance Reports	EPA/ERT Project Officer and QA Manager

D. DATA VALIDATION AND USABILITY

D1. DATA REVIEW, VERIFICATION AND VALIDATION

All data produced under this QAPP will be evaluated to determine compliance with the stated collection methods, type, and number of samples collected, sample handling, and correct analytical procedures. Data review will be conducted in the laboratory prior to data release to evaluate the validity of the sample batch. Two data quality indicators, precision and accuracy, will be used to assess the batch. Data verification is the steps taken to determine whether the quality requirements specified in the "B" elements of this QAPP have been met. Data verification will be performed by the REAC TL/QC Coordinator and the Inorganics Group Leader. The TL will be notified by the DV&RW Group when inconsistencies or non-compliant laboratory data are discovered. For field activities, it is necessary to determine whether the samples were collected using the sampling design specified in element B1, whether the samples were collected according to a specific method or SOP as specified in element B2, whether the collected samples have been recorded

and handled properly as in element B3, and whether the proper amount of QC samples were taken to satisfy the QC requirements specified in element B5. For analytical activities, each sample should be verified to ensure that the procedures used to generate the data (as specified in element B4) were performed as specified. The proper amount of QC checks (as specified in element B5) that were prepared and analyzed during the actual analysis provide an indication of the quality of the data. Instrument calibrations (as specified in element B7) are evaluated to determine whether the correct number of calibration standards were used and the range of the analysis, whether standards were analyzed in an appropriate sequence specific to the methods used, and were performed prior to the analysis of samples, blanks and QC samples in an appropriate time frame.

The DV&RW Group is responsible for reviewing the data against a set of criteria to verify its validity prior to use. The data validation process summarizes the data and QC deficiencies, and determines the impact on the overall data quality. Data validation qualifiers are assigned in the data assessment records, flagged on the results tables and are noted in the case narrative of the final analytical report.

D2. VERIFICATION AND VALIDATION METHODS

Data verification occurs at each level in the field and in the laboratory to ensure that appropriate outputs are being generated routinely. Records produced electronically or maintained as hard copies are subject to data verification. During field activities, records associated with sample collection such as field data sheets, COC records, shipper's air bills, logbook documentation, or electronic devices to log samples or print sample labels are verified against approved SOPs or procedures. At sample receipt, COC records are verified along with refrigerator and freezer logs to ensure the integrity of the samples. During sample preparation, digestion/extraction logs, certificates of analysis for surrogates and spiking compounds, refrigerator and freezer logs, analytical requests and standard preparation logs are verified. Manufacturer's certificates for calibration and/or internal standards, instrument run or injection logs, standard preparation logs, calculation worksheets, and QC sample results are verified during the analysis of the sample set. Review of data package or client deliverables are verified for compliance with peer review procedures.

Data validation will be conducted to determine how seriously the sample data deviate from acceptance limits and the potential effect on the data. All anomalies will be documented in the case narrative of the final analytical report. The following REAC SOP will be used for metals and PCB data validation:

- REAC SOP #1017, *Data Validation Procedures for Routine Inorganic Analysis*
- REAC SOP #1020, *Data Validation Procedures for Routine PCB Aroclor Analysis*

D3. RECONCILIATION WITH USER REQUIREMENTS

Responsibility lies with the EPA; thus, this element is not applicable to this QAPP.

REFERENCES

REAC. 2003. Quality Assurance Project Plan for the Response Engineering and Analytical Contract.

U.S. Environmental Protection Agency. 2001. *EPA Requirements for Quality Assurance Project Plans*: EPA QA/R-5, EPA/240/B-01/003.

U.S. Environmental Protection Agency. 1990. *Quality Assurance/Quality Control Guidance for Removal Activities*, EPA/540/G-90/004, Office of Emergency and Remedial Response.

TABLE 1. Field Sampling Summary - Soil, Turf, Dust
Tidewater Bailing Site
Newark, New Jersey
November 2007

							QC Extras				
Analytical Parameter	Action Level[1]	Matrix	Container Type and Volume (No. Containers Required)	Preservative	Holding Times	Subtotal Samples	Rinsate Blanks[2]	Field/ Trip Blanks[3]	PE Samples[4]	Total Matrix Spikes[5]	Total Field Samples[6]
ICP Lead	400 mg/kg	S, T, M, R Dust	4-oz glass/Ziploc bag	4°C	6 months	46	NA	NA	NA	5	46
PCB	0.49 mg/kg	S, R	4-oz glass	4°C	14 days/40 days	21	NA	NA	NA	2	21

NOTES: S = Soil, T = Turf, M = Mat, R = Residue,ICP = Inductively Coupled Plasma, NA = Not applicable, °C = degrees centigrade, ppm = parts per million, mg/kg = milligrams per kilogram, oz = ounce, XRF = x-ray fluorescence

1. Cleanup goal or health-based risk
2. If dedicated sampling tools are not used, rinsate blanks are required for the aqueous matrix. They are optional for the soil matrix. For DC2 (optional) and DD (mandatory), a minimum of one blank is required per type of sampling device per day. For SD, enter "NA."
3. Field blanks are required for aqueous and nonaqueous matrices. Aqueous field blanks are prepared with distilled/deionized water and nonaqueous field blanks are prepared with clean sand or soil. For SD/DC (optional) and DD (mandatory), one blank required per day. For SD, enter "NA." For SD/DC (optional) and DD (mandatory), one trip blank is required per cooler used to transport VOA samples. For SD, enter "NA". Each aqueous trip blank consists of two 40-mL vials filled with distilled/deionized water. Each nonaqueous trip blank consists of two 40-mL vials filled with clean sand or soil.
4. Performance evaluation samples are optional for SD/DC and DD at one per parameter per matrix. For SD, enter "NA."
5. Ensure that a sufficient volume of environmental sample is collected for lab spiking. All analyses conducted at the REAC laboratories require matrix spike samples at a frequency of ≥ 10 percent of the total samples, regardless of data category. In addition, for SD/DC and DD: Determine bias (percent recovery) using a minimum of two matrix spikes. Determine precision using a minimum of eight matrix spikes.
6. Add the numbers of rinsate blanks, field blanks, trip blanks, and PE samples to the subtotal number of samples to determine this.

TABLE 2. QA/QC Analysis and Data Categories Summary - Soil, Turf, Dust
Tidewater Bailing Site
Newark, New Jersey
November 2007

			Matrix Spikes		QA/QC	
Analytical Parameter	Matrix*	Analytical Method Ref.	Lab[1]	Additional[2]	Detection Limits[3]	Data Category[4]
ICP Lead	S, T, M, R, Dust	REAC SOP #1811	5	NA	1.0 mg/kg	DD
PCB	S, R	REAC SOP #1801	2	NA	41.7 - 83.3 ug/kg	DD
XRF Pb	S, T	REAC SOP #1700	NA	NA	~25 to 50 mg/kg	SD

NOTES: S = Soil, T = Turf, M = Mat, R = Residue, ICP = Inductively Coupled Plasma, XRF = X-ray Fluorescence, SD = Screening Data, NA= Not Applicable, DD= Definitive Data, ug/kg= microgram/kilogram, mg/kg = milligrams per kilogram

1. Ensure that a sufficient volume of environmental sample is collected for lab spiking. All analyses conducted at the REAC laboratories require matrix spike samples at a frequency of ≥10 percent of the total samples, regardless of data category.
2. For SD/DC and DD: Determine bias (percent recovery) using a minimum of two matrix spikes. Determine precision using a minimum of eight matrix spikes. Laboratory matrix spikes may be utilized to fulfill these additional QC requirements.
3. To be determined by the person arranging the analysis. Should be equal to or less than the action level.
4. Enter data category desired: SD, SD/DC, DD